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III. *An Account of the Manner of Manuring Lands by Sea-shells, as practised in the Counties of Londonderry and Donegall in Ireland. By his Grace the Lord Archbishop of Dublin. Communicated by Samuel Molyneux Esq;*

BOTH these Counties are very mountainous, and those Mountains covered with Boggs and Heath, in so much that there is little Arable Ground in them, except what has lately been made so. There are three ways practis'd to reduce Heath and Bog to Arable Land: The first is by cutting of the Scurf of the Ground, making up the Turf so cut in heaps, and when the Sun has dryed these Heaps, they are then set on Fire; when burnt as much as they can be, then those heaps are scattered on the Ground, and it being Plowed, it beareth Barley, Rye, or Oats, for about three Years.

The Inconveniencies are first, that such Burning defiles the Air, causeth Rain and Wind, is not practical in a wet Summer; and by destroying the Sap of the Earth and Roots of the Grass, and all other Vegetables, renders it useless for several Years after the third, in which it is Plowed.

The second way is by Liming; this is much better than the former, because it doth not so much Depauperate the Ground, will last long, and beareth better Grain, and whatever is pretended, doth not destroy the Grass, if due care be taken not to over Plow it; but then this is very dear, and Lime-stone is not every where to be had, and in many Places Fire is wanting.

Dung is the Common Manure in all places, and therefore I shall say nothing of it.

Marl is not used, that I have observed, in the North, but about the Sea side the great Manure is Shells: Any one that will look into the Map, will see how the Bay of *London*, commonly call'd *Loughfoyle*, lies; towards the Eastern part of it there lies several Eminencies that hardly appear at Low Water; these are made of Shells of Sea-fish of all sorts, more particularly of Perriwinkle, Cockles, Limpet, &c. The Country Men come with Boats at Low Water, and carry Loads of these Shells away; they leave them in heaps on the Shoar, and there let them lie till they drain and dry, and by that means become much lighter for Carriage; they carry them by Boats as far as the Rivers will allow them, and then in Sacks on Horses perhaps six or seven Miles into the Country; they allow sometimes 40, but mostly 80 Barrels to an Acre; they agree with Boggy, Heathy, Clay, Wet, or Stiff Land, but not with Sandy. They seem to give the Land a sort of ferment, as Barm doth to Bread, opening and loosening the Clods, and by that means making way for the Roots to penetrate, and the Moisture to enter into the Fibers of the Roots: The Manure continues so long, that I could find none that could determine the time of its enduring.

The Reason of its long continuance seems to be this, that the Shells melt every Year a little till they be all spent, which requires a considerable time, whereas Lime, &c. operates all in a Manure at once; but it's to be observed, that in six or seven Years the Ground grows so mellow, that Corn that grows on it becomes rank and runs out in Straw to such a length, that it can't support it self, and then the Land must be suffered to lie a Year or two, that the ferment may be a little quieted and the Clods harden, and then it will bear as long again, and,
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for ought I know and could find it, continues to do so with the like intermissions for 20 or 30 Years.

In the Years in which the Land is not Plowed, it bears a fine Grass mixed with Daisies in abundance ; and it is pleasant to see a steep high Mountain, that a few Years before was all Black with Heath, on a sudden look white with Daisies and Flowers.

It fines the Grass, but makes it short tho thick: Observing that this Manure produced Flowers in the Field, I made my Gardener use these Shells in my Flower Garden, and never saw better Carnations, or Flowers fairer or larger than in that Cold Climate ; and it contributes to destroy Weeds, at least doth not produce them so much as Dung ; it likewise produces very good Potatoes at about a Foot distance from one another ; and this is one Method of reducing Boggy Barren Land. They lay a little Dung or Straw on the Land, and sprinkle it with Shells ; sometimes they cut the Potatoes if large, that they may go the farther, and then dig Trenches about six or seven Foot distance, and throw the Earth or Soil they take out of them on the Potatoes, so as to cover them, and then fencing the Plot of Ground so planted, let them grow. Plant them in *April* or *May*, and they are ripe in *August* ; they dig them as they have occasion, and let them lie till next Year, then dig them again, and so the third Year, every Year they by this means go deeper in the Earth, and the last they dig them, then pick them out as carefully as they can, that little Seed may remain ; and the fourth Year they Plow the Ground and Sow Barley, and the Produce is very good for some Years ; some Potatoes will remain and grow up without any hurt to the Barley or Oats, and those they dig and pick out, and the Ground remains good and Arable ever after.

'Tis observable, that Shells do best in Boggy Ground, where the Surface is Turf ; Turf generally is nothing but the Product of Vegetables, such as Grass, Heath, &c.
that

that being rotten the Salt is washed away by the Water, and there remains only the Earthy, and especially the Sulphureous parts of them, as appears from the Inflammability of Turf; now Shells being chiefly a Salt, it incorporates with the Sulphur of the Plants, and renders them fit for the Vegetation of New Plants.

And this appears further from this, that Shells, that have been under the Salt Water, are much better then such as have been in the Earth, or dry at the Strands: Almost about the Bay of *Londonderry* if you dig a Foot or two it yields Shells, and whole Banks are made up of them; but these, tho' more intire then such as are brought out of the Shell Island, are not so profitable for Manure.

I observed in a place near *Newtown Lamavady*, about two Miles from the Sea, a Bed of Shells, such as lie on the Strand; the place was cover'd with a Scurf of wet spouty Earth about a Foot thick; the Country People used the Shells, but they were not reckon'd so good as those that are found in the Sea or near it.

The Land about the Sea-side bears very indifferent Wheat, nor will the Shells, in that particular, without some Dung; but I very much doubt whether that be not due to the ignorance of the Farmers that generally understand nothing of Wheat.

Some thousands of Acres have been improved by the Shells, and that which formerly was not worth a Groat per Acre, is now worth four Shillings: They have in many Places thus improved the very Mountains that before were very Turf Bogs. In these they meet with this inconveniency, that if the Season for Plowing proves wet, their Horses sink so deep in the Soil, that they can't Plow it, especially after two or three Years.

They commonly made Lime of the Shells formerly, and some do so still. I have not, that I remember, seen any such Lime, but I understood that it bound very well,
and

and I believe it is not so corrosive as Lime made of Stones; for I find in the History of *Ceylon*, that they make up their Land with Lime of Oyster-Shells, and which, I believe, would be impracticable with common Lime.

About thirty Years ago they made Lime of the Shells, and Manured their Lands with it; but a poor Countryman, that out of Laziness or Poverty had not provided to make Lime, threw the Shells unburnt on his Land; his Crop proved as good as his Neighbours, and the second and third Crop better, and all took the hint, and have used them so ever since.

Where Shells are not to be procured, Sea Rack or Sand supply the want of them, but are not so good; Sea Rack lasts but three years, and Sand little longer.

'Tis certain *Ireland* has been better Inhabited than it is at present: Mountains, that now are covered with Bogs, have formerly been Plowed; for when you dig five or six Foot deep, you discover a proper Soil for Vegetables, and find it Plowed into Ridges and Furrows: This is observable in the Wild Mountains between *Ardmagh* and *Dundalk*, where the Redoubt is Built, and likewise on the Mountains of *Altmore*: The same, as I am informed, has been observed in the County of *Londonderry* and *Donegall*; a Plow was found in a very deep Bogg in the latter, and a Hedge with Wattles standing, under a Bogg that was five or six Foot deep above it. I have seen the Stump of a large Tree in a Bogg ten Foot-deep at *Castle-Forbes*; the Trunk had been burnt, and some of the Cynders and Ashes lay still on the Stump. I have seen likewise large Old Oaks grow on Land, that had the Remains of Ridges and Furrows. And I am told, That on the top of an high Mountain in the North, there are yet remaining the Streets and Footsteps of a large Town; and in truth, there are few places, but either visibly, or when the Bogg is removed, there remains marks of the Plow; which sure must prove, that the Country was well Inhabited.

Inhabited. It's likely that the *Danes* first, and then the *English* destroyed the People ; and the old Woods seem to those that pretend to judge, to be about three or four hundred years standing, which was near the time that *Courcey* and the *English* subdued the North of *Ireland*, and 'tis likely made havock of the People that remained after the *Danes* were beat out of *Ireland*.

IV. De Linearum Curvarum Longitudine Authore Jo. Craig.

L E M M A.

Duorum Quadratorum summam in alia duo Quadrata dividere.

SINT dx^2 , ds^2 duo Quadrata data, quorum summa $dx^2 + ds^2$ dividenda est in alia duo Quadrata dx^2 , dy^2 ; sintque m , & n duo quilibet numeri ad arbitrium sumendi. Jam ex conditione Problematis est $dx^2 + dy^2 = dx^2 + ds^2$, unde (ut ex Diophanto constat)

$$\text{erit } dx = \frac{mm - nn \times dz + 2mn ds}{mm + nn},$$

$$dy = \frac{nn - mm \times ds + 2mn dz}{mm + nn} \dots \text{Q. E. J.}$$